

AY121 Course Assessment Questions—Lab 4 related

YOUR NAME:

1. On your computer screen, all colors are made from linear combinations of the following primary colors (check all that apply):
 - (a) yellow
 - (b) red **correct**
 - (c) white
 - (d) orange
 - (e) green **correct**
 - (f) blue **correct**
 - (g) cyan
 - (h) grey
 - (i) magenta
2. On your computer screen, when you combine colors of equal intensity to obtain a new color, which of the following apply (check all that apply): **NONE is correct**
 - (a) orange = yellow + green
 - (b) orange = red + green
 - (c) orange = yellow + red
 - (d) white = yellow + green + cyan
 - (e) white = red + green + cyan
 - (f) white = yellow + red + cyan
3. You wish to map the entire sky, fully sampling to avoid aliasing, with a telescope having a half-power beam width (HPBW) or, equivalently, a full-width half-maximum (FWHM), of 0.5 degrees. The number of independent pixels that you need to sample is about:
 - (a) 20,000
 - (b) 40,000
 - (c) 80,000
 - (d) 160,000
 - (e) 320,000
 - (f) 640,000 **correct**

4. The HI 21-cm line is a good indicator or tracer of (check all that apply):
- (a) molecular clouds
 - (b) star-forming regions
 - (c) recently-formed stars
 - (d) regions where supernovae exploded fairly long ago **correct**
 - (e) the mass distribution in the Galaxy **correct**
5. The most common molecule in interstellar space is
- (a) H₂O
 - (b) CH₃OH
 - (c) H₂ **correct**
 - (d) OH
 - (e) H₂CO
6. The 21-cm line intensity is a direct tracer of
- (a) HI column density, under all conditions
 - (b) HI column density, if the line is optically thick
 - (c) HI column density, if the line is optically thin **correct**
 - (d) HI column density, under no conditions
7. To completely specify the polarization state of astronomical radiation, one needs:
- (a) the magnitude and position angle of linear polarization
 - (b) the magnitude and position angle of circular polarization
 - (c) the three Stokes parameters
 - (d) the four Stokes parameters **correct**
 - (e) the five Stokes parameters

8. ‘Antenna temperature’ specifies (mark all correct answers):
- (a) the temperature of the antenna’s receiver, e.g. as it is cooled by a cryogenic refrigerator
 - (b) the specific intensity seen by the antenna’s feed **correct**
 - (c) the ambient temperature of the antenna structure, e.g. as it is warmed by the Sun or cools off at night
 - (d) the flux density seen by the antenna’s feed
 - (e) the brightness temperature of a source whose size is much smaller than the antenna’s beamwidth
 - (f) the brightness temperature of a source whose size is much larger than the antenna’s beamwidth **correct**
9. If one power level is 3 dB higher than another, then the ratio of the two powers is approximately (mark all correct answers)
- (a) a factor of 2 **correct**
 - (b) a factor of 10^2
 - (c) a factor of $10^{0.2}$
 - (d) a factor of 3
 - (e) a factor of 10^3
 - (f) a factor of $10^{0.3}$ **correct**
10. A power level of 25 dBm is about the same ($\sim 10\%$) as (mark all correct answers)
- (a) 25 milliwatts
 - (b) 25 microwatts
 - (c) 2.5 milliwatts
 - (d) 2.5 microwatts
 - (e) 300 milliwatts **correct**
 - (f) 300 microwatts
 - (g) 10^{25} milliwatts
 - (h) $10^{2.5}$ milliwatts **correct**